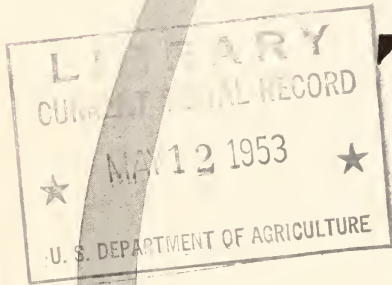


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THE

PERIODICAL

CICADA

"The 17-Year Locust"

THE PERIODICAL CICADA

No other insect in North America excites as much curiosity and wonder as does the periodical cicada when it makes its sudden, springtime appearance at intervals of 17 or 13 years.

After years of living in underground tunnels, millions of cicadas issue from the earth as if by a predetermined signal, undergo startling transformations, and spread through nearby trees and bushes. From morning till night they fill the air with their weird, droning song. In a few weeks, after mating and laying eggs, they die.

The periodical cicada, often erroneously called the 17-year locust, is widely distributed over the eastern half of the United States, and occurs nowhere else in the world. In the North its life cycle is completed in 17 years; in the South the cycle is completed in 13 years.

The adult insect is about $1\frac{5}{8}$ inches long. Most of its body is black. The legs are reddish, some of the veins in the nearly transparent wings are orange, and the eyes are red.

The periodical cicada, known scientifically as *Magicalcica septendecim*, is closely related to common cicadas, which appear every year. The com-

mon cicadas, called harvest flies and dog-day cicadas, appear later in the season than the periodical, and the adults live longer. Their whirring song, which is slightly similar to that of the periodical cicadas, but has less variation in the notes, is a "lazy" sound that we associate with the languorous days of late summer.

Cicadas have a beak for piercing plant tissue and drawing sap into their bodies. They are large relatives of leafhoppers, aphids, scales, and other sucking insects.

Some Misconceptions

The dramatic and bizarre elements in the life cycle of the periodical cicada have caused the insect to be regarded, not only with curiosity, but also with superstition and fear.

Even before the white man came to North America, the Indians thought its periodic appearance had an evil significance.

Early American colonists had never seen the periodical cicada. They were familiar with the Biblical story of locust plagues in Egypt, but were not sure what kind of insect the story referred to. When the cicadas appeared suddenly by the millions, some of the

colonists thought a "locust plague" had been visited upon them.

To some extent the confusion between cicadas and locusts exists today; cicadas are commonly called locusts. The term "locust" is correctly applied only to certain species of grasshoppers. Migratory locusts, which comprise one of these species, ruined crops in Egypt in Biblical times. They still damage crops in that country and in many other parts of the world.

Even when the periodical cicada is not confused with some other insect, its appearance in overwhelming numbers arouses fear that crops will be destroyed. But the cicada does not feed on foliage of any kind. If the adults feed at all, they do so by inserting their beaks in bark and sucking juice. Although the adults cause no feeding damage, the adult females make injurious punctures in twigs and limbs of trees and bushes with their egg-laying apparatus.

A false belief that is much less widely held today than formerly is that the distinct black **W** toward the outer end of the front wings foretells war. The mark is a characteristic of the species, and is

produced by deeper pigmentation of the veins.

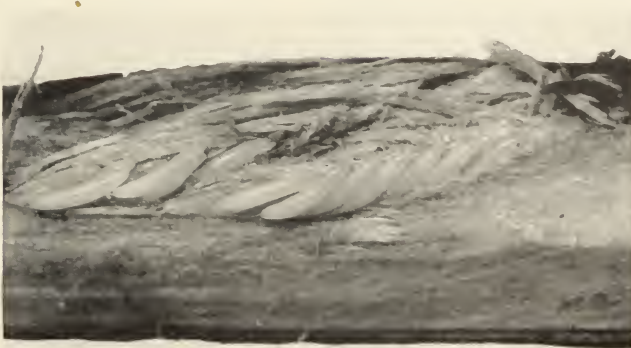
The cicada cannot sting, and any story is mythical that tells of cicadas poisoning fruit by stinging it.

How Cicadas Develop

Using the blades of a curved, sawlike egg-laying apparatus on the end of the abdomen, the female cicada punctures the bark of a twig and makes a pocket in the wood. In the pocket she lays 24 to 28 eggs in 2 rows. She then moves forward, cuts another pocket, and lays more eggs. She continues this process until 5 to 20 pockets have been made in the twig. The pockets are placed close together in a straight row. Sometimes they form a continuous slit 2 or 3 inches long. Moving from one twig to another, a cicada lays a total of 400 to 600 eggs.

The eggs are laid in twigs and small branches of a wide variety of trees and plants. They hatch in 6 to 7 weeks. The immature insects are called nymphs.

The newly hatched nymphs fall to the ground and burrow until they find suitable roots, from which they suck



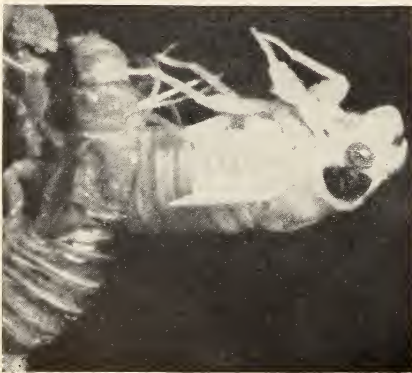
Section through egg punctures showing rows of eggs.
About 5 times natural size.



Nymph ready for transformation.



Adult beginning to issue from nymphal skin.



Adult nearly free from nymphal skin.

juice. This is the beginning of a 17- or 13-year period of underground existence. Most of the nymphs are 18 to 24 inches beneath the surface.

By spring of the 17th or 13th year the nymphs are fully grown. The



Freshly transformed adult.

transformation to the adult stage of the life cycle is soon to occur. Several weeks before emerging from the ground, the nymphs start burrowing upward. When they have burrowed to about an inch beneath the surface, they stop and await the proper time to continue.

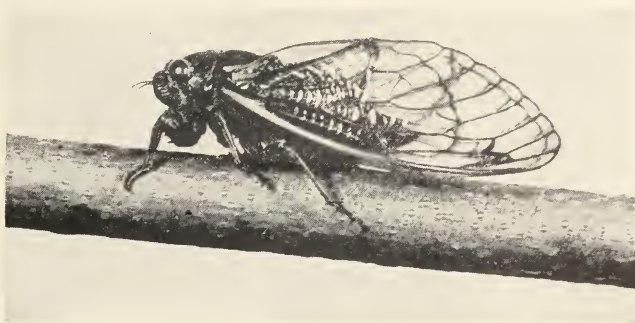
When the proper night comes, in April or May, the nymphs leave the ground in vast numbers and head for upright objects. A tree is the ideal goal if it can be attained. But the transformation from nymph to adult cannot be delayed. If a tree is not within range, a bush or a weed, a blade of grass, or even a post or a telegraph

pole, will do. The nymph secures a good hold on the object, splits its nymphal skin along the middle of the back, and laboriously works itself out.

The job of shedding the nymphal skin is completed in an hour or less. The cicada is now an adult, but is soft and white. It hardens and becomes darker. In a few hours it is fully mature.

farther north the cicadas are, the later they emerge.

The fact that periodical cicadas in the North have a 17-year life cycle, and those in the South a 13-year cycle, should not be interpreted to mean that the insect is seen only at 17-year intervals in the North and only at 13-year intervals in the South. The insects emerge somewhere almost every year.



Adult several hours after transformation.

The insects mate within a week after becoming adults. A few days after mating, the females lay eggs.

The adults live 5 or 6 weeks.

Not all cicadas pass through all the stages of development. Many eggs do not hatch. Some nymphs never get established on roots, and some die while trying to shed their nymphal skins.

When They Appear

Latitude and elevation produce the conditions that determine the date on which cicadas come out of the ground. In some southern areas the period of emergence begins in the last week of April. In some northern areas it begins in the last week of May. Between these early and late extremes, periods of emergence occur elsewhere. The

The explanation is that there are different broods, which emerge in different years.

Cicadas of the 17-year race that emerge in any given year comprise a brood, those that emerge the next year comprise another brood, and so on. The same is true of the 13-year race.

While adults of one brood are singing in the trees, other broods, in different stages of development, are in the soil—perhaps close by, perhaps hundreds of miles away. They will emerge when they have passed their allotted time in the soil.

Most of the broods are separated geographically, but some overlap.

The number of cicadas emerging in successive years is not maintained at anything like an even level. Four of

the 17 "possible" 17-year broods are referred to by such terms as "doubtful," "unimportant," and "almost extinct." We have only scattered records concerning them, and one or more may be extinct. Only two of the 13-year broods are large; a few others exist, but the exact number is not known.

In some years two broods emerge—one in the North and one in the South.

Where They Appear

The range of the periodical cicada covers nearly all the United States east of the Missouri Valley, and includes Arkansas and Louisiana.

There is considerable overlapping between the 17- and 13-year races.

Most broods are limited to fairly definite areas, but some consist of small, widely scattered colonies. Moreover, there are scattered colonies that seem to have little connection with large regional broods; nevertheless, when such a colony appears, it is considered to be a part of whatever brood appears the same year.

For convenience of reference the broods have been designated by Roman numerals. The numerals I through XVII are assigned to the 17-year broods, and XVIII through XXX to the 13-year broods. They are assigned as though a brood were to emerge each year, but, as previously mentioned, there may be gaps, especially in the 13-year broods.

Numbering of the 17-year broods under the present system began with the 1893 brood, which was designated brood I. The 1894 brood was brood II, the 1895 brood was brood III, and so on. In 1909 brood XVII appeared, and in 1910 brood I appeared again.

The following listing shows the more important broods, the area in which each occurs, the year of the last emergence (up to 1953), and the year in which the next emergence is due.

Brood I—a small brood that occurs principally in southeastern Pennsylvania, Maryland, northeastern West Virginia, Virginia, and western North Carolina; 1944, 1961.

Brood II—occurs along the eastern seaboard from Connecticut and southeastern New York to North Carolina; 1945, 1962.

Brood V—a compact brood that occurs in the eastern half of Ohio and throughout West Virginia except in the extreme southern part; 1948, 1965.

Brood VIII—occurs in western Pennsylvania, eastern Ohio, and the northern Panhandle of West Virginia; 1951, 1968.

Brood IX—occurs in West Virginia, western Virginia, and northwestern North Carolina; 1952, 1969.

Brood X—the largest brood; occurs in abundance over much of the northeastern quarter of the United States; 1936, 1953.

Brood XIX—occurs over much of the southern part of the United States; extends into the southern part of Illinois and to northern Missouri; 1946, 1959.

Brood XXIII—occurs in the Mississippi Valley from southern Indiana, southern Illinois, and Missouri to the Gulf; 1950, 1963.

The Cicada's Song

A few days after the periodical cicadas appear, their incessant drumming, or singing, is heard. Only the males have sound-producing apparatus, which consists of two shell-like inflated drums on the sides of the abdomen.

Two strong muscles set the drums in motion.

The chorus begins at dawn. As the temperature rises, the volume swells. Throughout the day a blanket of sound rests over the countryside. In the evening the sound ceases.

When heard from a distance, the cicada chorus is a whirring, droning monotone. But if attention is concentrated on an individual insect, several notes can be distinguished. The loudness is represented by the syllables "tsh-ee-EEEE-e-ou." It is sustained 15 to 20 seconds. The middle portion is loud and shrill.

Another note is represented by "AH-O-oo." It has a mournful quality, and terminates abruptly in a lowered pitch. It is usually sustained about 3 seconds, and is repeated at intervals of 2 to 5 seconds.

Other notes consist of prolonged burring, which is the basic sound of the cicada, and soft, short purrs.

To begin a note, the cicada lifts its abdomen (the back part of the body) to a rigid, horizontal position. When the sound ends, the abdomen drops back to the usual, somewhat sagging position.

Damage to Trees

The egg-laying habits of the female cicada, which have been described, can cause severe damage or even destruction to young, transplanted trees in nurseries and orchards, and some damage to older trees.

Egg punctures can cause the twigs and branches of small, immature trees to wilt; and the wounds can give ingress to disease and serve as shelters and feeding locations for scale insects, woolly aphids, and other insects.

Twigs in which many egg pockets are made are often broken or partly broken from the tree. Some fruit is lost from bearing trees that have been severely injured.

Seventy or eighty species of trees, shrubs, and herbaceous plants harbor the eggs of the cicada. Those for which the female seems to have a preference are oak, hickory, apple, peach, pear, and grape.

Cicadas cause no visible feeding damage to plants and trees.

Reducing the Damage

The insecticide TEPP is effective against the cicada. Spraying should begin just as the cicadas begin laying eggs. Repeated applications are usually needed to hold an infestation in check.

CAUTION.—TEPP is extremely dangerous to handle. Serious illness, or even death, may result if it is swallowed, inhaled, or absorbed through the skin. Read and follow the precautions on the label.

TEPP acts only on direct contact with the insect. It does not affect insects that come to the tree after the spray has dried. Thus orchards close to heavily infested woodlands have to be sprayed almost daily. Orchards farther from heavy infestations can be protected reasonably well by three or four applications a week apart. The spray is most effective if applied early in the day, before the cicadas become very active.

Prepare the spray by mixing TEPP with water. Mix one-half pint of a 20-percent concentrate, or one-fourth pint of a 40-percent concentrate, with 100 gallons of water.

Orchard trees 1 or 2 years old may be protected by covering them with open-weave cloth, such as heavy cheese-cloth, netting, tobacco shade cloth, or the cloth used to cover tobacco seed-beds in the South. The cloth should be put in place as the cicadas begin to appear and should remain until, about 5 weeks later, most of them are gone.

Many growers refrain from planting orchards in a cicada year, or in the preceding year. Before postponing the planting of trees, they should consider cloth protection. The cost may be less than the loss represented by 1 or 2 years of delay in the development of a new orchard.

If little or no pruning is done to large trees the winter preceding an in-

festation, much of the injured wood can be pruned away the following winter.

In residential areas where the cicadas have previously been abundant, it is advisable not to plant young shrubs or trees around the home the year another emergence is expected.

Natural Enemies

Birds destroy many cicadas. Where cicadas are numerous and birds rather few, as in dense woods, cicadas are not materially reduced. Where the situation is reversed, as in small, open groves, or near houses, cicadas may be greatly reduced by birds.

Insects and mites attack cicada eggs, and a fungus disease kills some adults.

THIS LEAFLET was prepared by the Division of Insect Detection and Identification and the Division of Fruit Insect Investigations, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration.

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